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Environmental Noise Assessment

Lot 2812 (#121) Exmouth Drive, Butler
Proposed Childcare Centre

Reference: 22057268-01B

Prepared for:
Ladybug Eleven Pty Ltd c/- Apex Planning

Report: 22057268-01B

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Date:	Rev	Description	Prepared By	Verified
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1 INTRODUCTION

It is proposed to construct a childcare centre (CCC) at Lot 2812 (#121) Exmouth Drive, Butler (refer *Figure 1-1*). The proposed centre, shown in site plan *Figure 1-2*, will consist of the following:

- Six internal teaching spaces capable of accommodating up to 92 children, grouped as follows:
  - Group 1: 8 places for children aged 0-2 years,
  - Group 2: 4 places for children aged 0-2 years, 10 places for children aged 2-3 years,
  - Group 3: 15 places for children aged 2-3 years,
  - Group 4: 10 places for children aged 2-3 years, 5 places for children aged 3-4+ years,
  - Group 5: 20 places for children aged 3-4+ years,
  - Group 6: 20 places for children aged 3-4+ years,
- Outdoor play areas located on the north side of the building.
- Amenities and associated mechanical plant such as:
  - Kitchen with rangehood and exhaust fan assumed to be located on the roof above,
  - Various exhaust fans (toilets, laundry) assumed to be located on the roof above, and
  - AC plant assumed to be located on the roof above.
- Car parking used for the CCC on the south side of the lot.

It is noted that noise sensitive premises are in the vicinity of the subject site, with nearby residential properties located to the north and east of the CCC.

This report presents the assessment of the noise emissions from child play, car doors closing in the car park and mechanical plant associated with the childcare centre against the prescribed standards of the *Environmental Protection (Noise) Regulations 1997* (the Regulations) based on the development drawings shown in *Appendix A*.

The proposed hours of operation are 6.30am to 6.30pm Monday to Friday. Therefore, staff and parents can arrive and park before 7.00am, which is during the night-time period of the Regulations. It is assumed outdoor child play would not occur until after 7.00am.

An assessment of noise intrusion resulting from the 13.8 km extension of the passenger railway from Butler Station to Yanchep – refer *Figure 1-1* to the childcare centre has also been undertaken in accordance with *State Planning Policy 5.4 Road and Rail Noise*. Lloyd George Acoustics provided a transportation noise assessment to PTA for this future rail extension. Details from this have been incorporated into the noise assessment.

Appendix B contains a description of some of the terminology used throughout this report.

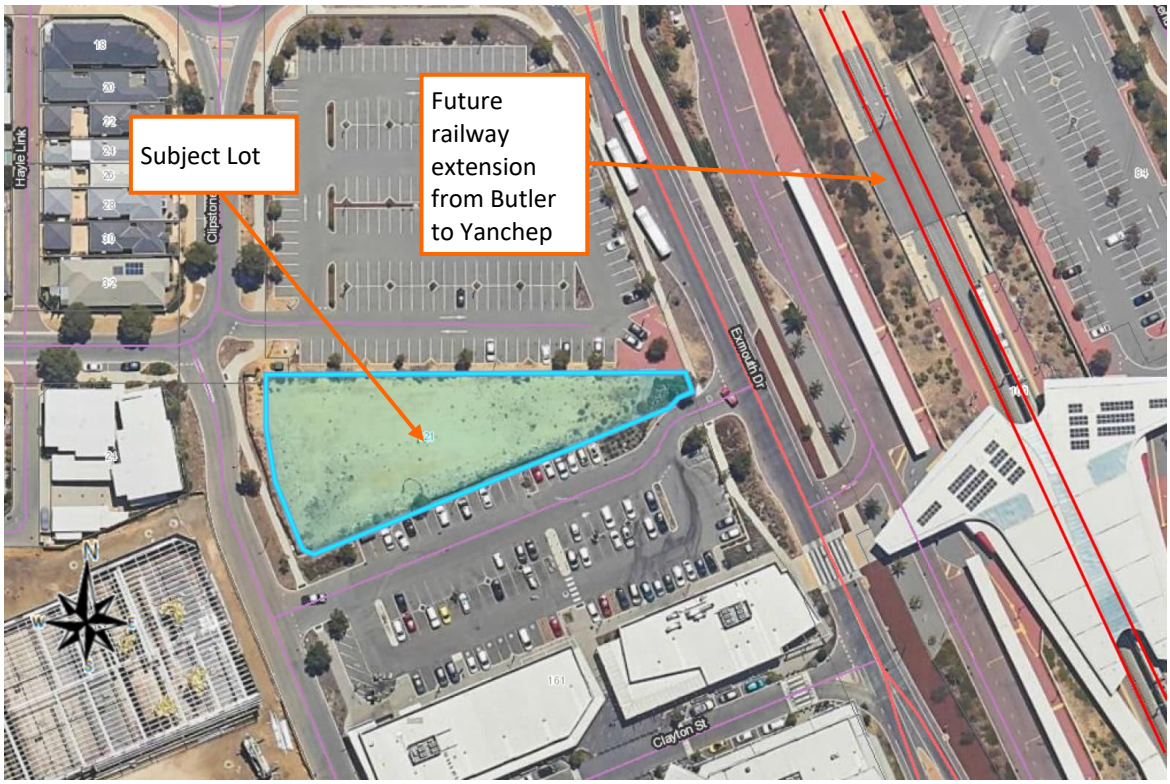

Figure 1-1 Project Locality (PlanWA)

Figure 1-2 Project Site Plan

2 CRITERIA

2.1 Environmental Noise

Environmental noise in Western Australia is governed by the *Environmental Protection Act 1986*, through the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

Regulation 7 defines the prescribed standard for noise emissions as follows:

"7. (1) Noise emitted from any premises or public place when received at other premises –

(a) Must not cause or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind; and

(b) Must be free of –

i. tonality;

ii. impulsiveness; and

iii. modulation,

when assessed under regulation 9"

A "…noise emission is taken to significantly contribute to a level of noise if the noise emission … exceeds a value which is 5 dB below the assigned level…"

Tonality, impulsiveness and modulation are defined in Regulation 9. Noise is to be taken to be free of these characteristics if:

(a) The characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission; and

(b) The noise emission complies with the standard prescribed under regulation 7 after the adjustments of *Table 2-1* are made to the noise emission as measured at the point of reception.

Table 2-1 Adjustments Where Characteristics Cannot Be Removed

Where Noise Emission is Not Music			Where Noise Emission is Music	
Tonality	Modulation	Impulsiveness	No Impulsiveness	Impulsiveness
+ 5 dB	+ 5 dB	+ 10 dB	+ 10 dB	+ 15 dB

Note: The above are cumulative to a maximum of 15dB.

The baseline assigned levels (prescribed standards) are specified in Regulation 8 and are shown in *Table 2-2*.

Table 2-2 Baseline Assigned Noise Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area[1]	0700 to 1900 hours Monday to Saturday (Day)	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays (Sunday)	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days (Evening)	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80

1. ***highly sensitive area*** means that area (if any) of noise sensitive premises comprising —
   (a) a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
   (b) any other part of the premises within 15 metres of that building or that part of the building.

As the surrounding area has a mix of commercial and residential premises, the total influencing factor applicable at surrounding noise sensitive premises has been calculated as 1 dB. As Butler Boulevard (considered a secondary road) is over 100m from the nearby residents, a transport factor of 0 dB has been used within the assessment.

The combined traffic and land use influencing factors for all surrounding residences, as shown in *Figure 1-1*, has been calculated as shown in *Table 2-3.* It was determined that all residences nearest to the development have the same influencing factor when rounding to the nearest whole number.

Table 2-3 Influencing Factor Calculation – Nearest Residences

Description	Within 100 metre Radius	Within 450 metre Radius	Total
Industrial Land	0 %	0 %	0 dB
Commercial Land	12-18% / 0.6- 0.9 dB	9% / 0.5 dB	1.1-1.4 dB
Transport Factor			**0 dB**
Total			**1 dB**

Table 2-4 shows the assigned noise levels including the influencing factor and transport factor at the receiving locations.

Table 2-4 Assigned Noise Levels

Premises Receiving Noise	Time Of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
All nearest highly sensitive areas[1]	0700 to 1900 hours Monday to Saturday (Day)	46	56	66
	0900 to 1900 hours Sunday and public holidays (Sunday)	41	51	66
	1900 to 2200 hours all days (Evening)	41	51	56
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	36	46	56
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80

1. ***highly sensitive area*** means that area (if any) of noise sensitive premises comprising —
   (a) a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
   (b) any other part of the premises within 15 metres of that building or that part of the building.

It is noted the assigned noise levels are statistical levels and therefore the period over which they are determined is important. The Regulations define the Representative Assessment Period (RAP) as a period of time of not less than 15 minutes, and not exceeding 4 hours, which is determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission. An inspector or authorised person is a person appointed under Sections 87 & 88 of the Environmental Protection Act 1986 and include Local Government Environmental Health Officers and Officers from the Department of Environment Regulation. Acoustic consultants or other environmental consultants are not appointed as an inspector or authorised person. Therefore, whilst this assessment is based on a 4 hour RAP, which is assumed to be appropriate given the nature of the operations, this is to be used for guidance only.

Regulation 14A provides requirements for the collection of waste stating that this activity can also be exempt from having to comply with regulation 7 prescribed standards provided it is undertaken between 7am and 7pm Mondays to Saturdays and undertaken in the quietest reasonable manner.

2.2 Transportation Noise

The criteria relevant to this assessment is provided in *State Planning Policy No. 5.4 Road and Rail Noise* (hereafter referred to as SPP 5.4) produced by the Western Australian Planning Commission (WAPC). The objectives of SPP 5.4 are to:

- Protect the community from unreasonable levels of transport noise;
- Protect strategic and other significant freight transport corridors from incompatible urban encroachment;
- Ensure transport infrastructure and land-use can mutually exist within urban corridors;
- Ensure that noise impacts are addressed as early as possible in the planning process; and

- Encourage best practice noise mitigation design and construction standards

Table 2-5 sets out noise targets that are to be achieved by proposals under which SPP 5.4 applies. Where the targets are exceeded, an assessment is required to determine the likely level of transport noise and management/mitigation required.

Table 2-5 Noise Targets for Noise-Sensitive Land-Use

Outdoor Noise Target		Indoor Noise Target	
55 dB $L_{Aeq(Day)}$	50 dB $L_{Aeq(Night)}$	40 dB $L_{Aeq(Day)}$ (Living and Work Areas)	35 dB $L_{Aeq(Night)}$ (Bedrooms)

Notes:

- Day period is from 6am to 10pm and night period from 10pm to 6am.
- The outdoor noise target is to be measured at 1-metre from the most exposed, habitable[1] facade of the noise sensitive building.
- For all noise-sensitive land-use and/or development, indoor noise targets for other room usages may be reasonable drawn from Table 1 of Australian Standard/New Zealand Standard AS/NZS 2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors (as amended) for each relevant time period.
- Outdoor targets are to be met at all outdoor areas as far as is reasonable and practicable to do so using the various noise mitigation measures outlined in the Guidelines.

The application of SPP 5.4 is to consider anticipated traffic volumes for the next 20 years from when the noise assessment is undertaken.

In the application of the noise targets, the objective is to achieve:

- indoor noise levels specified in *Table 2-5* in noise-sensitive areas (e.g. bedrooms and living rooms of houses and school classrooms); and
- a reasonable degree of acoustic amenity for outdoor living areas on each residential lot. For non-residential noise-sensitive developments, for example schools and childcare centres, the design of outdoor areas should take into consideration the noise target.

[1] A habitable room is defined in State Planning Policy 3.1 as a room used for normal domestic activities that includes a bedroom, living room, lounge room, music room, sitting room, television room, kitchen, dining room, sewing room, study, playroom, sunroom, gymnasium, fully enclosed swimming pool or patio.

3 METHODOLOGY

3.1 Environmental Noise

Computer modelling has been used to predict the noise emissions from the development at all nearby receivers. The software used was *SoundPLAN 8.2* with the ISO 9613 algorithms (ISO 171534-3 improved method) selected, as they include the influence of wind and are considered appropriate given the relatively short source to receiver distances.

Input data required in the model are:

- Meteorological Information;
- Topographical data;
- Ground Absorption; and
- Source sound power levels.

3.1.1 Meteorological Information

Meteorological information utilised is provided in *Table 3-1* and is considered to represent worst-case conditions for noise propagation. At wind speeds greater than those shown, sound propagation may be further enhanced, however background noise from the wind itself and from local vegetation is likely to be elevated and dominate the ambient noise levels.

Table 3-1 Modelling Meteorological Conditions

Parameter	Day (0700-1900)	Night (1900-0700)
Temperature (°C)	20	15
Humidity (%)	50	50
Wind Speed (m/s)	Up to 5	Up to 5
Wind Direction*	All	All

* Note that the modelling package used allows for all wind directions to be modelled simultaneously.

It is generally considered that compliance with the assigned noise levels needs to be demonstrated for 98% of the time, during the day and night periods, for the month of the year in which the worst-case weather conditions prevail. In most cases, the above conditions occur for more than 2% of the time and therefore must be satisfied.

3.1.2 Topographical Data

Topographical information was based on data publicly available (e.g. *Google*) in the form of spot heights and combined with finished floor levels where provided on the development drawings. Lloyd George Acoustics also provided a transportation noise assessment for PTA and topographical data from this model have been incorporated in the design model.

3.1.3 Buildings and Receivers

Surrounding existing buildings were included in the noise model, as these can provide noise shielding as well as reflection paths.

Nearby existing houses to the north are single storey based on *Streetview* images and were modelled as 3.5 metres high buildings, with receivers located 1.4 metres above ground level. The residential buildings to the east of the CCC are double storey and were modelled at 6m, with receivers located at 1.4m and 4.2m above ground level. The childcare centre building incorporates a car park and play area as shown in the design drawings of *Appendix A* and this was reproduced within the noise model.

Figure 3-1 shows a 2D overview of the noise model with the location of all relevant receivers identified.

3.1.4 Walls and Fences

A solid timber fence design spaced with visually permeable vertical fins is proposed alongside the play area, with a height ranging from 1.8m to 2.45m.

Figure 3-2 shows a view of the 3D model based on the information above in relation to topography and building and fence heights. Also shown are the outdoor play areas (pink polygon) and point sources (e.g. mechanical plant, car doors) as pink dots.

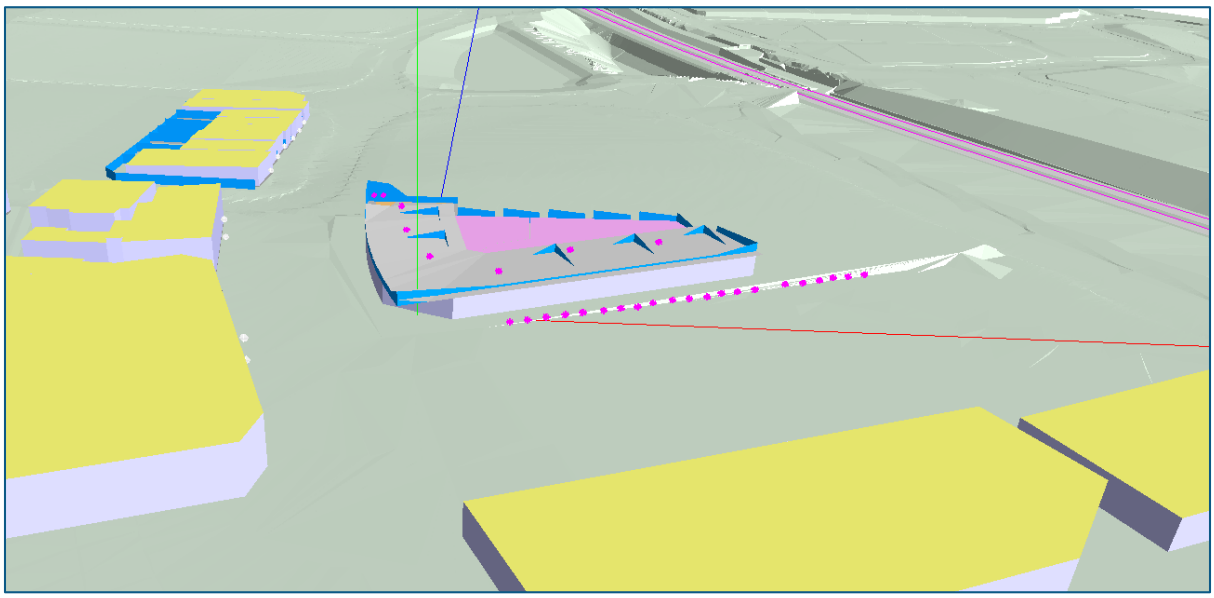

Figure 3-1 South Elevation View of 3D Noise Model

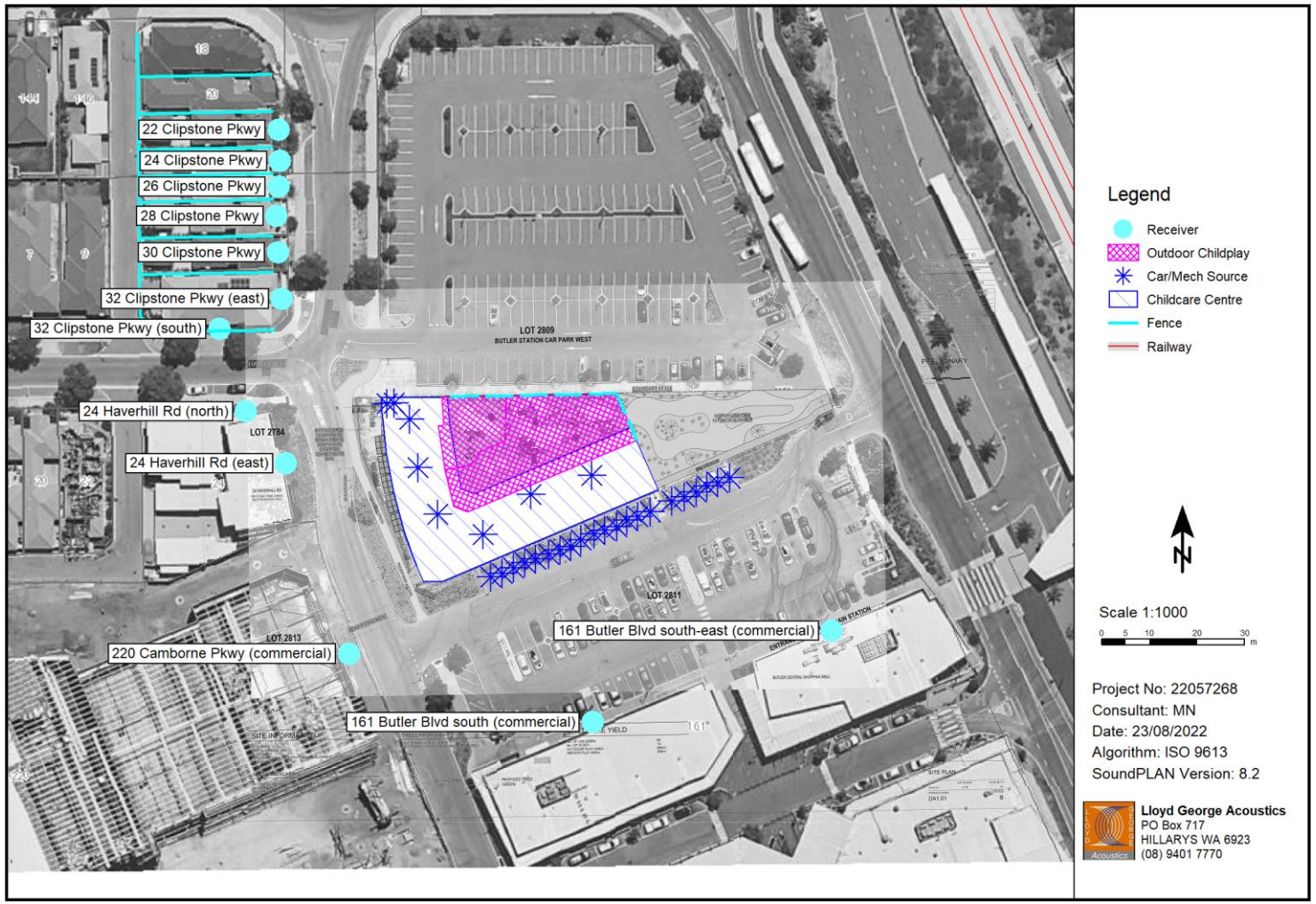

Figure 3-2 2D Overview of Noise Model

3.1.5 Source Sound Levels

The sound power levels used in the modelling are provided in *Table 3-2*.

Table 3-2 Source Sound Power Levels, dB

Description	Octave Band Centre Frequency (Hz)								Overall dB(A)
	63	125	250	500	1k	2k	4k	8k	
Babies Play Aged 0-2 Years (10 kids), L_{10}	48	54	60	66	72	74	71	67	**78**
Toddler Play Aged 2-3 Years (10 kids), L_{10}	61	67	73	79	81	78	74	70	**85**
Kindy Play Aged 3+ Years (10 kids), L_{10}	64	70	75	81	83	80	76	72	**87**
AC plant, double fan unit (4 off), each, L_{10}	-	77	77	76	73	68	67	62	**78**
Toilet/Laundry Exhausts, each, L_{10}	49	54	51	52	49	50	45	42	**56**
Kitchen Exhaust, L_{10}	50	64	61	70	69	66	62	50	**73**
Closing Car Door, L_{max}	71	74	77	81	80	78	72	61	**84**

The following is noted in relation to the source levels above:

- Child play source levels are based on Guideline 3.0 provided by the Association of Australasian Acoustical Consultants (AAAC) published September 2020. Where the number of children for individual play areas is specified in the plans, these have been adjusted from the reference source levels using appropriate acoustical calculations. Outdoor child play was modelled as area sources at 1-metre heights above ground level. The sound power levels used in the model were scaled as follows:
    - 12 children aged 0-2 years = 80 dB(A)
    - 35 Toddlers aged 2-3 years = 89 dB(A)
    - 45 Kindy aged 3+ years = 93 dB(A)
- Based on the AAAC Guideline 3.0, source sound power levels for AC condensing units were assumed. Medium sized (double fan) outdoor units were deemed appropriate. Each was modelled as a point source located on the ground in the nominated yard as indicated on plans. It is noted that screening will be provided and this has been replicated in the noise model.
- Other mechanical plant includes five exhaust fans (toilets and laundry) and one kitchen exhaust fan/rangehood fan. All were modelled as point sources approximately 0.5 metres above roof level and above the area serviced.
- Car doors closing were modelled as a point source 1.0 metre above ground level. Since noise from a car door closing is a short term event, only the L_{Amax} level is applicable.

3.1.6 Ground Absorption

Ground absorption varies from a value of 0 to 1, with 0 being for an acoustically reflective ground (e.g. asphalt, concrete) and 1 for acoustically absorbent ground (e.g. grass/sand). In this instance, a value of 1 has been used for the outdoor play area and parks, and 0.1 for all other areas.

3.2 Transportation Noise

To address the noise impact from rail noise, noise modelling has been undertaken generally in accordance with the requirements of SPP 5.4 and associated Guidelines[2]. Lloyd George Acoustics provided a study for the PTA Butler to Yanchep rail extension and this was adapted to the CCC site.

3.3 Noise Modelling

The computer programme *SoundPLAN 8.2* was utilised incorporating the Nordic Rail Prediction Method (Kilde Rep. 130) algorithm. The algorithm has been modified to reflect local conditions as follows:

- The Nordic Rail Prediction Method (Kilde Rep. 130) algorithm is for generic train types in Europe and requires modification to align with measured noise levels of passenger trains operating in the Perth region. Measured noise levels used are shown in *Table 3-1*.

Table 3-3 Sound Pressure Levels Used in the Noise Model

Description	dB(A) at One-Third Octave Frequencies (Hz)									Overall dB(A)
	31.5	63	125	250	500	1K	2K	4K	8K	
Train speed of 130 km/hr at a distance of 15m	30	51	59	62	73	79	79	77	69	87
	35	54	61	65	73	79	80	74	64	
	42	53	61	69	78	80	78	72	58	

3.3.1 Ground Topography, Rail Design & Cadastral Data

Topographical data was based on that provided by PTA with the contours being in 0.01 metre intervals. The railway design and groundworks have been incorporated into the existing ground levels to develop a 3-dimensional model. It should be noted that the railway has been designed to be in a cutting, between 4-7m below ground level, for the majority of the alignment and that the modelling has taken this into account.

3.3.2 Train Data

The train configuration and numbers of movements used in the noise prediction modelling are presented below in *Tables 3-2 and 3-3.*

Table 3-4 Variables Used in the Noise Prediction Model

Description of Variable	Value
Type of noise source	Line source
6 Car Set	150 metres
Height of noise source above railhead	0.8 metres

[2] Road and Rail Noise Guidelines, September 2019, Western Australia Planning Commission

Table 3-5 Daily Rail Movements Assumed in the Noise Model

Train Description	Train Movements	
	Day	Night
6 Car Sets	Northbound	
	75	22
6 Car Sets	Southbound	
	75	22

3.3.3 Train Speeds

The calculated train speeds, based on simulation plots determined by Australis Rail Consulting, are shown in *Figure 3-3*. The black dotted line shows the maximum speed limit (km/h), the red line shows the actual calculated train speed attained (km/h), and the brown line shows the vertical track profile (m). Note that the train does not always reach the maximum speed limit due the requirement to stop at stations and the effect of track gradients and alignment.

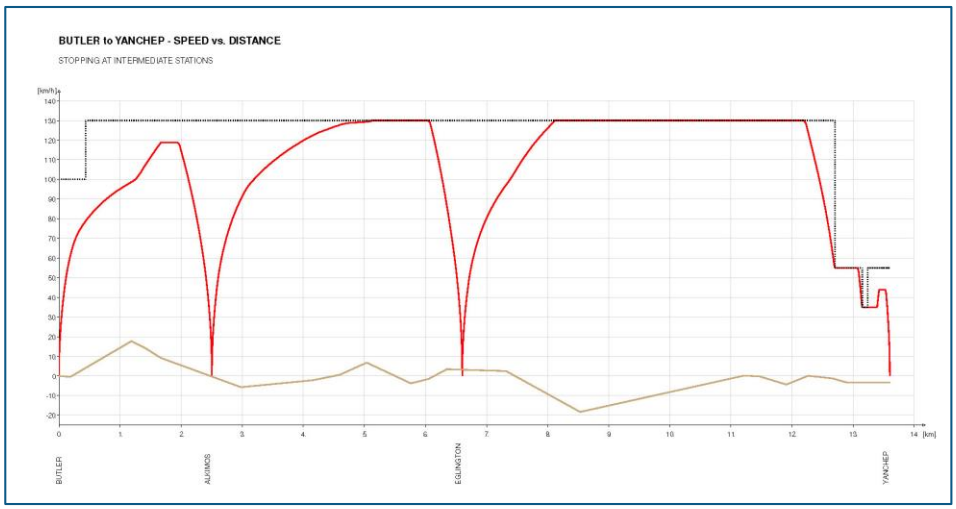

Figure 3-3 Train Speeds vs Distance Butler to Yanchep

4 RESULTS

4.1 Outdoor Child Play

The childcare development will host up to 92 children. It is noted play time is generally staggered and therefore not all children would be playing outside at once for extended periods of time. However, noise levels were conservatively predicted for all children playing, as a worst-case scenario.

Table 4-1 presents the predicted noise levels at each receiver, noting the predicted noise levels are from child play only i.e. mechanical plant noise is not included. *Figure 4-1* also shows the predicted noise levels as noise contour maps at ground level (1.4 metres AGL).

Table 4-1 Predicted Noise Levels of Child Play, dB L_{A10}

Receiver	16 Children (Aged 0-2)	20 Toddlers (2-3)	50 Kindy (3+)	Total Combined
22 Clipstone Pkwy - GF	21	38	35	40
24 Clipstone Pkwy - GF	21	39	35	40
26 Clipstone Pkwy - GF	21	39	36	40
28 Clipstone Pkwy - GF	22	39	36	41
30 Clipstone Pkwy - GF	22	39	36	41
32 Clipstone Pkwy - GF (east)	22	39	36	41
32 Clipstone Pkwy - GF (south)	13	29	26	31
24 Haverhill Rd - GF (east)	18	32	28	33
24 Haverhill Rd - 1F (east)	20	37	34	39
24 Haverhill Rd - GF (north)	13	25	22	27
24 Haverhill Rd - 1F (north)	14	28	25	30
161 Butler Blvd - GF (south-east)	16	31	28	33
161 Butler Blvd - GF (south)	17	28	25	30
220 Camborne Pkwy - GF	17	32	29	34
220 Camborne Pkwy - 1F	21	36	33	38

The highest predicted levels are to the residences to the north. While these levels indicate the conservative potential outcome, in reality noise levels would be lower on average, with reduced child numbers (staggered play times) and with periods of passive play.

Figure 4-1 Child Play Noise Contour Plot (1.4m AGL), dB L_{A10}

Predicted Noise level

	= 41
	= 46
	= 51
	= 56
	= 61

Legend

- Receiver
- Outdoor Childplay
- Car/Mech Source
- Childcare Centre
- Fence

N

Scale 1:700

0 4 8 16 24 m

Project No: 22057268
Consultant: MN
Date: 23/08/2022
Algorithm: ISO 9613
SoundPLAN Version: 8.2

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4.2 Mechanical Plant

Mechanical plant consists of AC plant and extraction fans for the kitchen, toilets and laundry. The exhaust fans were assumed to be located on the roof and above the room being serviced. The AC plant was modelled as per the designated rooftop areas on the west side of the building.

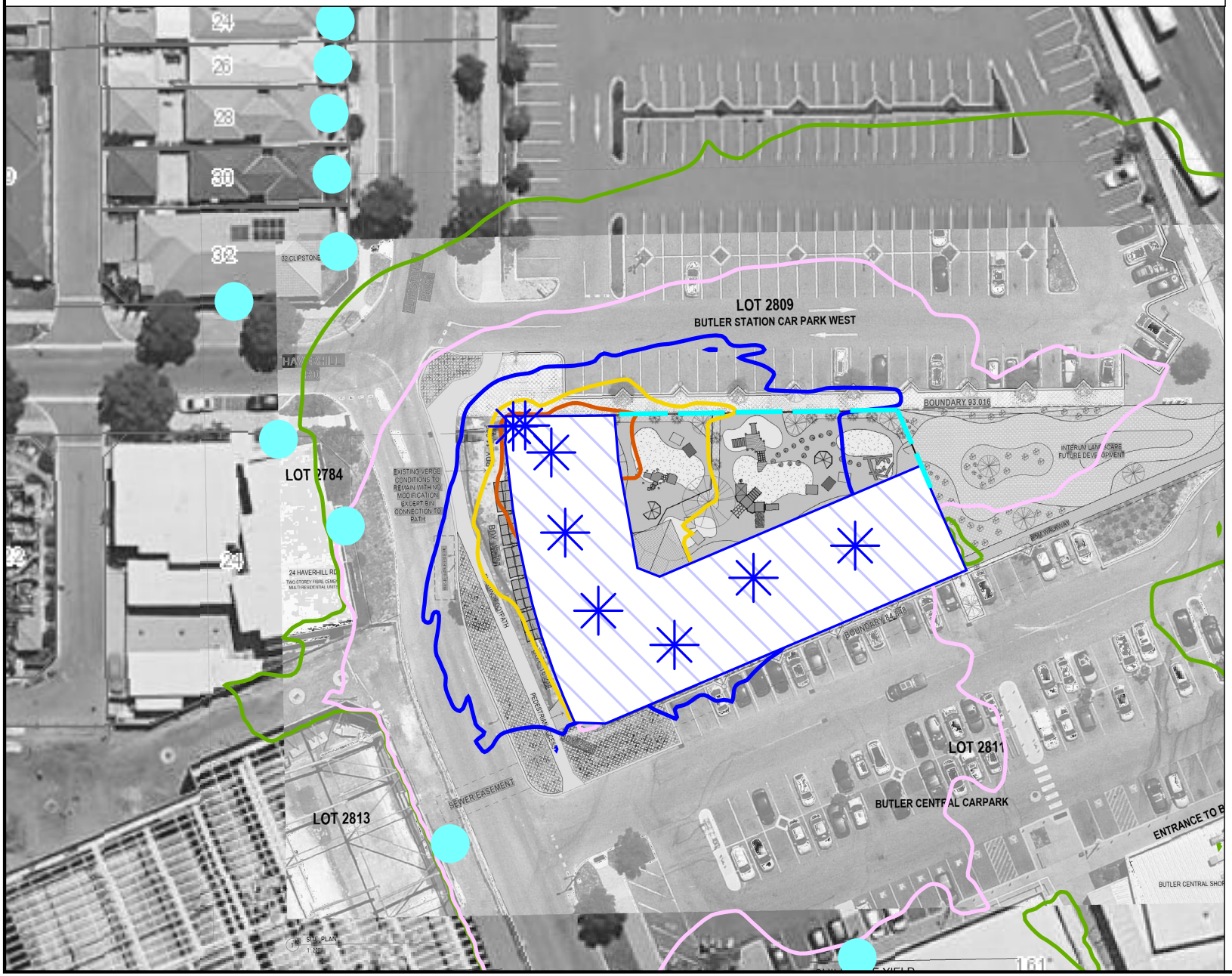
The predicted mechanical plant noise levels are presented in *Table 4-2*. *Figure 4-2* shows the predicted noise levels as noise contour maps at the first floor level (4.2 metres AGL) as the noise levels are higher at this level.

Table 4-2 Predicted Noise Levels of Mechanical Plant, dB L_{A10}

Receiver	All Plant Combined
22 Clipstone Pkwy - GF	21
24 Clipstone Pkwy - GF	21
26 Clipstone Pkwy - GF	22
28 Clipstone Pkwy - GF	23
30 Clipstone Pkwy - GF	25
32 Clipstone Pkwy - GF (east)	27
32 Clipstone Pkwy - GF (south)	19
24 Haverhill Rd - GF (east)	31
24 Haverhill Rd - 1F (east)	33
24 Haverhill Rd - GF (north)	20
24 Haverhill Rd - 1F (north)	23
161 Butler Blvd - GF (south-east)	28
161 Butler Blvd - GF (south)	31
220 Camborne Pkwy - GF	34
220 Camborne Pkwy - 1F	37

It can be seen that at most of the receivers, the predicted mechanical plant noise is lower than the child play noise levels (*Table 4-1*). Therefore, child play noise would dominate the noise levels during the day at most receivers, except prior to 7.00am, when child play noise is not present. The above results are based on assumed plant source levels and should therefore be recalculated once mechanical plant specifications are known closer to building permit application.

Figure 4-2 Mechanical Plant Noise Contour Plot (4.2m AGL), dB L_{A10}



Predicted Noise level

	= 31
	= 36
	= 41
	= 46
	= 51

Legend

- Receiver
- Outdoor Childplay
- Car/Mech Source
- Childcare Centre
- Fence

N

Scale 1:700

0 4 8 16 24 m

Project No: 22057268
Consultant: MN
Date: 23/08/2022
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4.3 Car Park

The model includes noise from car doors closing in all parking bays and *Table 4-3* presents the highest predicted noise levels applicable to each receiver. *Figure 4-3* also presents the maximum noise levels at the ground floor (1.4 m AGL) for car doors as a contour map. Note that this contour is not a cumulative level, but a composite contour of each maximum noise event.

Table 4-3 Predicted Car Doors Closing Noise Levels, dB L_{Amax}

Receiver	Car Doors
22 Clipstone Pkwy - GF	34
24 Clipstone Pkwy - GF	33
26 Clipstone Pkwy - GF	32
28 Clipstone Pkwy - GF	34
30 Clipstone Pkwy - GF	30
32 Clipstone Pkwy - GF (east)	28
32 Clipstone Pkwy - GF (south)	25
24 Haverhill Rd - GF (east)	41
24 Haverhill Rd - 1F (east)	40
24 Haverhill Rd - GF (north)	27
24 Haverhill Rd - 1F (north)	28
161 Butler Blvd - GF (south-east)	54
161 Butler Blvd - GF (south)	56
220 Camborne Pkwy - GF	54
220 Camborne Pkwy - 1F	53

Figure 4-3 Car Doors Noise Contour Plot (1.4m AGL), dB L_{AMAX}

Predicted Noise level

	= 51
	= 56
	= 61
	= 66
	= 71

Legend

- Receiver
- Outdoor Childplay
- Car/Mech Source
- Childcare Centre
- Fence

N

Scale 1:700

0 4 8 16 24 m

Project No: 22057268
Consultant: MN
Date: 23/08/2022
Algorithm: ISO 9613
SoundPLAN Version: 8.2

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4.4 Transportation Noise Modelling

Details of a railway noise assessment between Butler Station to Yanchep Station previously completed for PTA has been incorporated in the CCC transportation noise modelling.

For the childcare centre, it is the daytime noise levels that are critical. The noise model is considered for future daytime conditions which includes movement from the future rail extension.

Results for the future external noise level, predicted at each sensitive façade and the outdoor play space is presented in *Table 4-4*.

Table 4-4 Predicted External Noise Levels to CCC

Room	$L_{Aeq(Day)}$, dB
Cot Room (North)	49
Cot Room (South)	48
Group 1	48
Group 2	49
Group 3	47
Group 4	47
Group 5	47
Group 6	48
Outdoor play space	48

Based on the above outcomes, the railway noise intrusion at the CCC is below the outdoor noise target of SPP 5.4.

5 ASSESSMENT

5.1 Outdoor Child Play

Although the childcare centre opens from 6.30am, outdoor child play will only occur after 7.00am, when the assigned noise levels increase by 10 dB compared to prior to 7.00am. Noise from child play is not considered to contain annoying characteristics within the definition of the Regulations and therefore, no adjustments are made to the predicted noise levels.

Table 5-1 presents the assessment of the highest predicted noise levels from all 92 children playing outside against the L_{A10} assigned noise level at each receiver.

Table 5-1 Assessment of Outdoor Child Play Noise Levels, dB L_{A10}

Receiver	Assigned Noise Level	Predicted Level	Exceedance
22 Clipstone Pkwy - GF	**46**	40	*Complies*
24 Clipstone Pkwy - GF	**46**	40	*Complies*
26 Clipstone Pkwy - GF	**46**	40	*Complies*
28 Clipstone Pkwy - GF	**46**	41	*Complies*
30 Clipstone Pkwy - GF	**46**	41	*Complies*
32 Clipstone Pkwy - GF (east)	**46**	41	*Complies*
32 Clipstone Pkwy - GF (south)	**46**	31	*Complies*
24 Haverhill Rd - GF (east)	**46**	33	*Complies*
24 Haverhill Rd - 1F (east)	**46**	39	*Complies*
24 Haverhill Rd - GF (north)	**46**	27	*Complies*
24 Haverhill Rd - 1F (north)	**46**	30	*Complies*
161 Butler Blvd - GF (south-east)	**60**	33	*Complies*
161 Butler Blvd - GF (south)	**60**	30	*Complies*
220 Camborne Pkwy - GF	**60**	34	*Complies*
220 Camborne Pkwy - 1F	**60**	38	*Complies*

Based on a conservative scenario of all 92 children playing simultaneously, the assessment demonstrates compliance at all receivers.

5.2 Mechanical Plant

Given the proposed opening hours of the childcare centre, the night-time period (i.e. before 7.00am) is most critical. The overall noise levels are generally dominated by the A/C condenser noise, which may be considered tonal, and a +5 dB adjustment (refer *Table 5-2*) applies to predictions.

Table 5-2 Assessment of Mechanical Plant Noise Levels, dB L_{A10}

Receiver	Night Assigned Noise Level	Predicted Level	Adjusted Level	Exceedance
22 Clipstone Pkwy - GF	**36**	21	26	*Complies*
24 Clipstone Pkwy - GF	**36**	21	26	*Complies*
26 Clipstone Pkwy - GF	**36**	22	27	*Complies*
28 Clipstone Pkwy - GF	**36**	23	28	*Complies*
30 Clipstone Pkwy - GF	**36**	25	30	*Complies*
32 Clipstone Pkwy - GF (east)	**36**	27	32	*Complies*
32 Clipstone Pkwy - GF (south)	**36**	19	24	*Complies*
24 Haverhill Rd - GF (east)	**36**	31	36	*Complies*
24 Haverhill Rd - 1F (east)	**36**	33	38	*+2*
24 Haverhill Rd - GF (north)	**36**	20	25	*Complies*
24 Haverhill Rd - 1F (north)	**36**	23	28	*Complies*
161 Butler Blvd - GF (south-east)	**60**	28	33	*Complies*
161 Butler Blvd - GF (south)	**60**	31	36	*Complies*
220 Camborne Pkwy - GF	**60**	34	39	*Complies*
220 Camborne Pkwy - 1F	**60**	37	42	*Complies*

The most critical receiver is located to the east of the CCC, with a predicted level of up to 38 dB L_{A10} on the first floor of 24 Haverhill Rd. This exceeds the criteria by to 2 dB. Compliance is demonstrated at all other receivers. Note that this assessment is based on assumptions in relation to the number, location, size and type of AC plant and exhaust fans. Therefore, mechanical plant noise is to be reviewed by a qualified acoustical consultant during detailed design, when plant selections and locations become known. It is recommended that plant be selected with a “quiet mode” capability programmed for night periods. Mechanical plant is deemed to be potentially compliant on this basis.

5.3 Car Doors

Car doors closing noise are short duration events and were therefore assessed against the L_{Amax} assigned noise level. Given the proposed hours of operation, staff and visitors may arrive before 7.00am when the night-time assigned noise level is applicable. Car door noise may be considered impulsive within the definition of the Regulations. Therefore, an adjustment of +10 dB (refer *Table 5-3*) is applied to the predicted noise levels.

Table 5-3 Assessment of Car Doors Closing Noise Levels, dB L_{Amax}

Receiver	Night Assigned Noise Level	Predicted Level	Adjusted Level	Exceedance
22 Clipstone Pkwy - GF	**56**	34	**44**	*Complies*
24 Clipstone Pkwy - GF	**56**	33	**43**	*Complies*
26 Clipstone Pkwy - GF	**56**	32	**42**	*Complies*
28 Clipstone Pkwy - GF	**56**	34	**44**	*Complies*
30 Clipstone Pkwy - GF	**56**	30	**40**	*Complies*
32 Clipstone Pkwy - GF (east)	**56**	28	**38**	*Complies*
32 Clipstone Pkwy - GF (south)	**56**	25	**35**	*Complies*
24 Haverhill Rd - GF (east)	**56**	41	**51**	*Complies*
24 Haverhill Rd - 1F (east)	**56**	40	**50**	*Complies*
24 Haverhill Rd - GF (north)	**56**	27	**37**	*Complies*
24 Haverhill Rd - 1F (north)	**56**	28	**38**	*Complies*
161 Butler Blvd - GF (south-east)	**80**	54	**64**	*Complies*
161 Butler Blvd - GF (south)	**80**	56	**66**	*Complies*
220 Camborne Pkwy - GF	**80**	54	**64**	*Complies*
220 Camborne Pkwy - 1F	**80**	53	**63**	*Complies*

Noise from car doors is demonstrated to comply at all nearest sensitive locations at all time periods.

5.4 Indoor Child Play

An assessment of noise levels from indoor child play was carried out and the resulting noise levels at all locations were predicted to be well below that of outdoor child play considered in *Section 4.1*. This assessment was carried out based on the following considerations:

- Internal noise levels within activity rooms would not exceed those from outdoor play for each age group, regardless of whether windows/doors are open; and,
- Any music played within the internal activity areas would be 'light' music with no significant bass content and played at a relatively low level.

6 RECOMMENDATIONS

Noise from child play is demonstrated to comply during the day at all nearest residences. The timber panels surrounding the child play area must be constructed of a material with minimum surface mass of 8 kg/m^2.

To minimise noise impact from kitchen exhaust fans, it is recommended that inline type fans, which could be installed with attenuators or diverted ducting, be favoured over externally mounted plant. The noise from AC condensing units may be mitigated with local solid screening and quiet mode programming prior to 7.00am. This should be explored during detailed design and verified by the mechanical services engineer and a qualified acoustical consultant, when plant selections and locations become finalised.

Noise intrusion from the railway extension from Butler to Yanchep is demonstrated to be below the outdoor noise target of State Planning Policy 5.4. The outdoor play area is adequately screened by the surrounding fence and is also considered to meet the State Planning Policy 5.4.

Regulation 14A provides requirements for the collection of waste stating that this activity can also be exempt from having to comply with regulation 7 prescribed standards provided it is undertaken between 7am and 7pm Mondays to Saturdays and undertaken in the quietest reasonable manner.

Separate to the above, the following ‘best practice’ measures could be incorporated to further reduce acoustic impact (though not specifically required to achieve compliance):

- The behaviour and 'style of play' of children should be monitored to prevent particularly loud activity e.g. loud banging/crashing of objects, 'group' shouts/yelling,
- Favour soft finishes in the outdoor play area to minimise impact noise (e.g. soft grass, sand pit(s), rubber mats) over timber or plastic,
- Favour soft balls and rubber wheeled toys,
- Crying children should be taken inside to be comforted,
- No amplified music to be played outside,
- Any music played within the internal activity areas to be 'light' music with no significant bass content and played at a relatively low level.
- Car park drainage grates to be plastic or metal with rubber gasket and secured to avoid excess banging.

7 CONCLUSIONS

The noise impacts from the proposed childcare centre to be located at Lot 2812 (#121) Exmouth Drive, Butler have been assessed against the relevant criteria of the *Environmental Protection (Noise) Regulations 1997*. Based on the modelling and assessments in relation to the noise emissions from child play, mechanical plant and car doors closing, it is concluded that compliance can be achieved for all nearest noise sensitive premises.

Appendix A

Development Plans

1 SITE PLAN
1 : 200

LEGEND

EXIST... to be retained (GREY)

PROPOSED TREE nominal locations shown (GREEN)

CHILDCARE CENTRE ANALYSIS

OPERATION HOURS 6:3... 0pm Monday... Sunday with up to four days open on the weekend for ope...

GROUP ROOM 1	0-24months	...8 PLACES	2 EDUCATORS
GROUP ROOM 2	0-24months	... PLACES	1 EDUCATORS
	24-36months	...LACES	EDUCATORS
GROUP ROOM 3	24-36months	...LACES	EDU...RS
GROUP ROOM 4	24-36months	...CES	EDU...RS
GROUP ROOM 5	36+ months	...ES	EDU...RS
GROUP ROOM 6	36+ months	...	2 EDUCATORS
			+ 2 STAFF
		92 P...	+ 17 STAFF (minimum at any time)

AREA ANALYSIS

TOTAL SITE AREA : 2215m²

SITE COVERAGE : 809m² (37%)

GFA : Gross leaseable area

GENERAL NOTES

DIMENSIONS TO BE VERIFIED ON SITE PRIOR TO COMMENCEMENT. PREPARATION OF SHOP DRAWINGS OR MANUFACTURING. FIGURED DIMENSIONS TAKE PRECEDENCE OVER SCALING.

VERIFY LOCATION OF EXISTING SERVICES BEFORE COMMENCEMENT.

ALL CONSTRUCTION TO BE IN ACCORDANCE WITH THE NATIONAL CONSTRUCTION CODE OF AUSTRALIA, BUILDING ACT 1975 AS AMENDED, STANDARD BUILDING BY-LAWS AND RELEVANT AUSTRALIAN STANDARDS.

ISSUE	DESCRIPTION	DATE
2	DEVELOPMENT APPLICATION SET	03/10/2022
1	DEVELOPMENT APPLICATION SET	06/09/2022

insite ARCHITECTS
77 Upper Heidelberg Road Ivanhoe
t (03) 9499 8174
www.insitearchitects.com.au

nido EARLY SCHOOLS

CLIENT: [illegible] PROPERTY

PROJECT: PROPOSED CHILDCARE CENTRE (92 places)

FILE: [illegible]

LOCATION: 121 EXMOUTH DRIVE, BUTLER WA

DRAWING TITLE: SITE PLAN

As indicated@A1 | DATE: OCT 2022

SS | PRINTED: 3/10/2022, 2:30:21 PM

CHECKED: AT | JOB No.: J0000734

1

DA02/2

DA ISSUE

1 GROUND FLOOR PLAN
1 : 100

GENERAL NOTES

DIMENSIONS TO BE VERIFIED ON SITE PRIOR TO COMMENCEMENT, PREPARATION OF SHOP DRAWINGS OR MANUFACTURING. FIGURED DIMENSIONS TAKE PRECEDENCE OVER SCALING.

VERIFY LOCATION OF EXISTING SERVICES BEFORE COMMENCEMENT.

ALL CONSTRUCTION TO BE IN ACCORDANCE WITH THE NATIONAL CONSTRUCTION CODE OF AUSTRALIA, BUILDING ACT 1975 AS AMENDED, STANDARD BUILDING BY-LAWS AND RELEVANT AUSTRALIAN STANDARDS.

ISSUE	DESCRIPTION	DATE
2	DEVELOPMENT APPLICATION SET	03/10/2022
1	DEVELOPMENT APPLICATION SET	06/09/2022

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CLIENT: JARRA PROPERTY

PROJECT: PROPOSED CHILDCARE CENTRE (92 places)

FILE: C:\Users\Sowmya\Documents\J0000734_EXMOUTH DVE, BULTER, DA_sowmyaQCJDT.rvt

LOCATION: 121 EXMOUTH DRIVE, BUTLER, WA

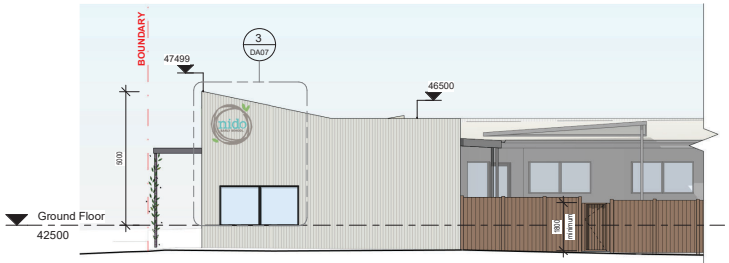
DRAWING TITLE: GROUND FLOOR PLAN

SCALE:	1 : 100@A1	DATE:	OCT 2022
DRAWN:	CW / SS	PRINTED:	3/10/2022 2:30:23 PM
CHECKED:	AH	JOB No.:	J0000734

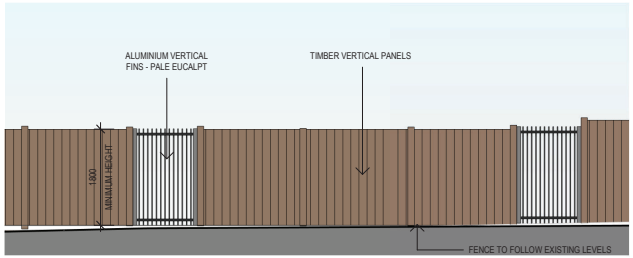
DA03/2

D/A ISSUE

1 SOUTH ELEVATION
1 : 100

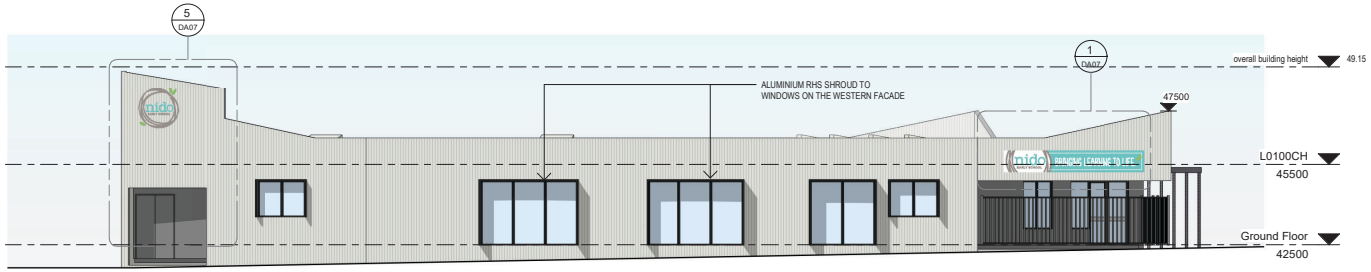


2 EAST ELEVATION
1 : 100



6 TYPICAL FENCE ELEVATION
1 : 50

3 NORTH ELEVATION
1 : 100



4 WEST ELEVATION
1 : 100

MATERIAL PALETTE

1 - LIGHT COLOURED METAL ROOFING 'SURFMIST' COLORBOND
2 - POLYCARBONATE ROOFING
3 - VERTICAL METAL WALL SHEETING 'COSMIC' COLORBOND
4 - OFF-WHITE FIBRE CEMENT PANELS WITH EXPRESSED JOINTS
5 - POWDERCOATED WINDOW/ DOOR FRAMES & LOUVRES - EVENING HAZE
6 - VINE COVERED TRELLIS OVER WALKWAYS
7 - ALUMINIUM VERTICAL FINS FENCING TO ENTRY
8 - PALE EUCALPT COLUMNS AND FENCING
9 - TIMBER SUN SHADES
10 - TIMBER HORIZONTAL PANELS ON ANGLE FENCING

GENERAL NOTES

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nido EARLY SCHOOL

CLIENT: JARRA PROPERTY

PROJECT: PROPOSED CHILDCARE CENTRE (92 places)

FILE: C:\Users\Soemya\Documents\J0000734_EXMOUTH DVE, BULTER, DA_soemyaQCJDT.rvt

LOCATION: 121 EXMOUTH DRIVE, BUTLER, WA

DRAWING TITLE: ELEVATIONS

SCALE: As indicated@A1 **DATE:** OCT 2022
DRAWN: Author **PRINTED:** 3/10/2022 2:30:28 PM
CHECKED: Checker **JOB No.:** J0000734

DA05/2

D/A ISSUE

Appendix B

Terminology

The following is an explanation of the terminology used throughout this report.

Decibel (dB)
The decibel is the unit that describes the sound pressure and sound power levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

A-Weighting
An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. An A-weighted sound level is described as L_A dB.

Sound Power Level (L_w)
Under normal conditions, a given sound source will radiate the same amount of energy, irrespective of its surroundings, being the sound power level. This is similar to a 1kW electric heater always radiating 1kW of heat. The sound power level of a noise source cannot be directly measured using a sound level meter but is calculated based on measured sound pressure levels at known distances. Noise modelling incorporates source sound power levels as part of the input data.

Sound Pressure Level (L_p)
The sound pressure level of a noise source is dependent upon its surroundings, being influenced by distance, ground absorption, topography, meteorological conditions etc and is what the human ear actually hears. Using the electric heater analogy above, the heat will vary depending upon where the heater is located, just as the sound pressure level will vary depending on the surroundings. Noise modelling predicts the sound pressure level from the sound power levels taking into account ground absorption, barrier effects, distance etc.

L_{ASlow}
This is the noise level in decibels, obtained using the A frequency weighting and the S (Slow) time weighting as specified in IEC 61672-1:2002. Unless assessing modulation, all measurements use the slow time weighting characteristic.

L_{AFast}
This is the noise level in decibels, obtained using the A frequency weighting and the F (Fast) time weighting as specified in IEC 61672-1:2002. This is used when assessing the presence of modulation only.

L_{APeak}
This is the greatest absolute instantaneous sound pressure in decibels using the A frequency weighting as specified in IEC 61672-1:2002.

L_{Amax}
An L_{Amax} level is the maximum A-weighted noise level during a particular measurement.

L_{A1}
An L_{A1} level is the A-weighted noise level which is exceeded for one percent of the measurement period and is considered to represent the average of the maximum noise levels measured.

L_{A10}
An L_{A10} level is the A-weighted noise level which is exceeded for 10 percent of the measurement period and is considered to represent the "*intrusive*" noise level.

L_{Aeq}
The equivalent steady state A-weighted sound level ("equal energy") in decibels which, in a specified time period, contains the same acoustic energy as the time-varying level during the same period. It is considered to represent the "average" noise level.

L_{A90}
An L_{A90} level is the A-weighted noise level which is exceeded for 90 percent of the measurement period and is considered to represent the "*background*" noise level.

One-Third-Octave Band
Means a band of frequencies spanning one-third of an octave and having a centre frequency between 25 Hz and 20 000 Hz inclusive.

L_{Amax} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded at any time.

L_{A1} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 1% of the representative assessment period.

L_{A10} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 10% of the representative assessment period.

Tonal Noise
A tonal noise source can be described as a source that has a distinctive noise emission in one or more frequencies. An example would be whining or droning. The quantitative definition of tonality is:

the presence in the noise emission of tonal characteristics where the difference between -

(a) the A-weighted sound pressure level in any one-third octave band; and

(b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

This is relatively common in most noise sources.

Modulating Noise
A modulating source is regular, cyclic and audible and is present for at least 10% of the measurement period. The quantitative definition of modulation is:

a variation in the emission of noise that —

(a) is more than 3 dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band;

(b) is present for at least 10% of the representative.

Impulsive Noise
An impulsive noise source has a short-term banging, clunking or explosive sound. The quantitative definition of impulsiveness is:

a variation in the emission of a noise where the difference between $L_{A\ peak}$ and $L_{A\ Max\ slow}$ is more than 15 dB when determined for a single representative event;

Major Road
Is a road with an estimated average daily traffic count of more than 15,000 vehicles.

Secondary / Minor Road
Is a road with an estimated average daily traffic count of between 6,000 and 15,000 vehicles.

Influencing Factor (IF)

$$= \frac{1}{10}(\%\ \text{Type A}_{100} + \%\ \text{Type A}_{450}) + \frac{1}{20}(\%\ \text{Type B}_{100} + \%\ \text{Type B}_{450})$$

where:

$\%\ \text{Type A}_{100}$ = the percentage of industrial land within a 100m radius of the premises receiving the noise

$\%\ \text{Type A}_{450}$ = the percentage of industrial land within a 450m radius of the premises receiving the noise

$\%\ \text{Type B}_{100}$ = the percentage of commercial land within a 100m radius of the premises receiving the noise

$\%\ \text{Type B}_{450}$ = the percentage of commercial land within a 450m radius of the premises receiving the noise

+ Traffic Factor (maximum of 6 dB)

= 2 for each secondary road within 100m

= 2 for each major road within 450m

= 6 for each major road within 100m

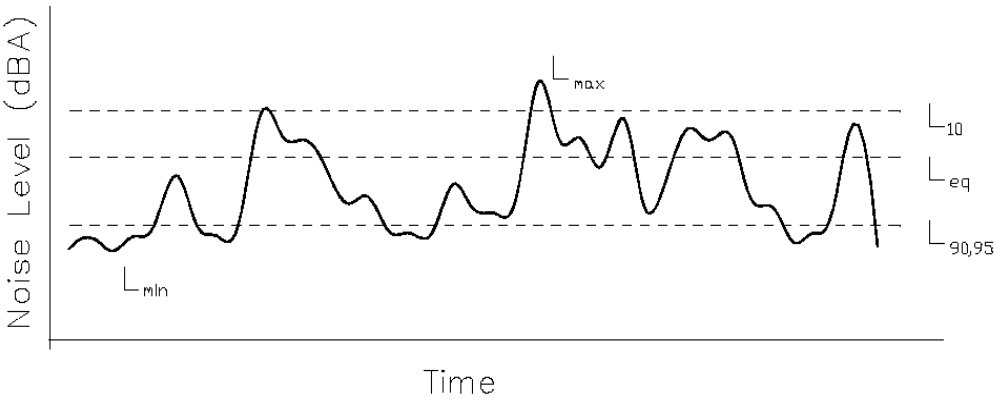
Representative Assessment Period
Means a period of time not less than 15 minutes, and not exceeding four hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission.

Background Noise
Background noise or residual noise is the noise level from sources other than the source of concern. When measuring environmental noise, residual sound is often a problem. One reason is that regulations often require that the noise from different types of sources be dealt with separately. This separation, e.g. of traffic noise from industrial noise, is often difficult to accomplish in practice. Another reason is that the measurements are normally carried out outdoors. Wind-induced noise, directly on the microphone and indirectly on trees, buildings, etc., may also affect the result. The character of these noise sources can make it difficult or even impossible to carry out any corrections.

Ambient Noise
Means the level of noise from all sources, including background noise from near and far and the source of interest.

Specific Noise
Relates to the component of the ambient noise that is of interest. This can be referred to as the noise of concern or the noise of interest.

Chart of Noise Level Descriptors



Typical Noise Levels